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U.S. Detects Soviets' Smallest Nuclear Tests

Sensitive Seismic Monitoring System Now Operates Worldwide

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The United States now operates a little-publicized, worldwide monitoring system that is designed to pick up all Soviet underground nuclear test explosions, according to congressional testimony and several former government scientists.

The United States added a sophisticated new seismic array in Norway in June, as part of an effort to upgrade the system, and is negotiating with another Nordic government over a similar facility, according to informed sources.

The new seismic arrays, which measure high frequency signals, will be able to pick up extremely low-yield, nuclear explosions at much longer distances than can be measured now with a lower-frequency seismic system operated with the Norwegians since 1970.

If the Soviets try to hide tests by exploding a nuclear device within a large underground cavern, a technique called decoupling, "we can discover tests" even under 10 kilotons with the arrays currently in operation, one scientist said.

Small underground nuclear explosions are used by the United States and the Soviet Union to test fission triggers for larger hydrogen bomb devices as well as small-scale versions of the weapons. They are less frequently used to test the reliability of weapons already in the stockpile.

U.S. capability to monitor these small tests permits American intelligence to keep track of all Soviet nuclear activities as well as gather data for verification for any future arms agreements.

U.S. intelligence agencies last week were described by a Pentagon source as "apoplectic" because both Secretary of State George P. Shultz and White House national security affairs adviser Robert C. McFarlane revealed that "the Soviet Union has conducted three tests within a matter of days" before proposing its five-month test moratorium.

None of those Soviet tests had been announced by the U.S. Department of Energy, but the Shultz and McFarlane statements showed the Soviets that U.S. detection systems are capable of discovering the lower-level tests.

The backbone of the U.S. nuclear test detection system are seismic facilities spread through some 35 countries and run by the Air Forces Technical Applications Center (AFTAC) at Patrick Air Force Base, Fla. Some devices were put in place 20 years ago to study earthquakes, but they have been supplemented more recently with modern units.

Two other systems for monitoring underground tests are also in the advanced development stage. One uses over-the-horizon radars to monitor disturbances in the upper atmosphere caused by shock waves generated by nuclear explosions.

The other uses microphone arrays to monitor very-low-frequency sound waves generated into the upper atmosphere by nuclear explosions.

U.S. officials say modernized monitoring arrays are useful both in determining Soviet compliance with the Threshold Test Ban Treaty and in gathering intelligence on the Soviet nuclear weapons programs.

The new, high-frequency, Norwegian array "should have a big impact on our ability" to monitor all Soviet tests, "even fully-decoupled ones," Jack F. Evernden, a specialist on seismic measurement for the U.S. Geological Survey, said. He said a second high-frequency array would greatly increase U.S. capabilities.

The Norwegian system receives data from a Soviet explosion and immediately transmits it to a U.S. satellite which relays it to an analysis center in the United States. A similar system of five modern seismic monitors exists in the United States and Canada, providing the U.S. center with instant data from several parts of the world.

The Scandinavian countries look on the new arrays not so much as intelligence-gathering devices but as instruments that could help bring about a test ban treaty between the United States and the Soviet Union that would bar all underground nuclear tests.

At the White House, however, officials said the United States has

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no plans to resume negotiations on such a treaty, despite the declaration by Soviet leader Mikhail Gorbachev of a moratorium on such tests until Jan. 1.

When Gorbachev proposed the five-month test moratorium on July 19, the White House quickly turned it down. Administration officials said they want to be able to continue testing to develop new warheads for the Midgetman small intercontinental missile and possible systems for the Strategic Defense Initiative, the so-called "Star Wars" research program.

McFarlane also said that the Soviet moratorium was temporary and predicted that the Soviets would resume testing when they wanted.

At the same time, the United States proposed that the Soviets send scientists to an upcoming test at the Nevada Test Site and give them the opportunity to place monitoring devices near the weapon. Administration officials would like to get a similar invitation from the Soviets.

Without such an on-site inspection, the Reagan administration has until now refused to support ratification of the threshold and peaceful nuclear explosion test agreements. For their part, the Soviets have argued the agreements contain adequate verification procedures and if the United States ratifies them, it would then consider additional steps to assure compliance.